

REMARKS

This application has been reviewed in light of the Office Action dated March 10, 2003. Claims 68-74 are pending in this application, with Claims 68 and 73 in independent form. Claims 61-67, which were withdrawn from consideration in the Office Action, have been cancelled without prejudice or disclaimer of the subject matter presented therein. Claims 71-74 have been added to provide Applicant with a more complete scope of protection. Claims 68-70 have been amended to define more clearly what Applicant regards as the invention. Favorable reconsideration is requested.

Claims 68-70 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,037,621 (Kennedy et al.) in view of U.S. Patent No. 6,123,764 (Mizugaki et al.).

Applicant submits that amended independent Claim 68 and newly added independent Claim 73, together with the remaining dependent claims, are patentably distinct from the proposed combination of the cited prior art for at least the following reasons.

Claim 68 requires a process for crystal growth by using a crystal growth apparatus. The crystal growth apparatus includes a crucible, a heating means, a supporting means, a cooling means, and a temperature detecting means. The crucible is for holding a crystal material. The heating means is capable of forming at a periphery of the crucible a temperature gradient within a temperature range including a melting point of the crystal material. The supporting means is for supporting a center bottom of the crucible. The cooling means is provided at the supporting means. The temperature detecting means is provided at a bottom of the crucible and is for detecting a temperature distribution across a first plane at the bottom of the crucible.

The process includes the steps of detecting the temperature distribution across the first plane of the crucible; and controlling the heating means and the cooling means such that in the detected temperature distribution across the first plane of the crucible, a temperature almost at a center portion of the first plane of the crucible is minimized.

A notable feature of Claim 68 is that the temperature detecting means is provided at a bottom of the crucible and is for detecting a temperature distribution across a first plane at the bottom of the crucible. Support for this feature can be found in the specification at least at page 76, line 25, to page 77, line 2, which states that “in the present example, in order to measure in-plane temperature distribution in the crucible 3, a plurality of thermocouples are set to the underside of the crucible 3 at its radius direction as shown in Fig. 24B.” (It is to be understood, of course, that the scope of Claim 68 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

In rejecting Claim 68, the Office Action refers to Kennedy et al. to allegedly teach a furnace for growing crystals, wherein a plurality of temperature measurements are taken during the growth by thermocouples. As for performing temperature measurements, Applicant understands the Kennedy et al. reference to disclose using the IR camera 40 to receive data, including temperature data, from the growth ampoule 30, shown in Figure 1. See also column 3, lines 19-24, and column 4, lines 1-22. The IR camera 40 is shown to be at the side of the growth furnace 10, capturing data through window 34. See Figure 1. However, Applicant has not found anything in Kennedy et al. that teaches or suggests using temperature detecting means provided at a bottom of the crucible for detecting a temperature distribution across a first plane at the bottom of the crucible, as recited in Claim 68.

Kennedy et al. also discloses a furnace temperature control unit 54 to maintain the temperature of the furnace. See column 3, lines 39-44, and column 5, line 62, to column 6, line 3. However, nothing has been found in Kennedy et al. which discloses that the furnace temperature control unit 54 is provided at a bottom of the furnace 10 for detecting a temperature distribution across a first plane at the bottom of the furnace 10.

Mizugaki et al. is understood to disclose a furnace with heaters 4, vertically aligned shelves 3 for multiple crucibles 1, and a supporting platform 5 located underneath the shelves 3. See Figure 1 and column 3, lines 29-45. However, Mizugaki et al. appears to be silent with regard to providing the temperature detecting means at a bottom of the crucible for detecting a temperature distribution across a first plane at the bottom of the crucible, as recited in Claim 68.

Applicant submits that the proposed combination of Kennedy et al. and Mizugaki et al., assuming such combination would even be permissible, would still fail to teach or suggest providing the temperature detecting means at a bottom of the crucible for detecting a temperature distribution across a first plane at the bottom of the crucible, as recited in Claim 68. Accordingly, Applicant submits that Claim 68 is patentable over these two patents, taken separately or in any proper combination, and withdrawal of the corresponding Section 103(a) rejection is respectfully requested.

Claim 73 recites many of the features of Claim 68, but requires that the crucible be divided into plural layers by a plurality of disks formed across respective cross-sections of the crucible, and that the temperature detecting means be provided in at least one of the disks for detecting a temperature distribution across that disk. Support for this feature can be found in the specification at least at page 77, lines 3-7, which states that “a hole is made in the disk 5 and a plurality of thermocouples are set thereto so that the

temperature distribution can be measured. At least three thermocouples are set to the disk 5 on its plane intersecting the direction of crystal growth.” (As with Claim 68, the scope of Claim 73 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

Kennedy et al. is not understood to disclose that the growth furnace 10 of Figure 1 has a plurality of disks formed along respective cross-sections of the crucible. Therefore, it is believed that Kennedy et al. does not teach or suggest that the crucible is divided into plural layers by a plurality of disks formed across respective cross-sections of the crucible, and that the temperature detecting means is provided in at least one of the disks for detecting a temperature distribution across that disk, as recited in Claim 73.

In regard to Mizugaki et al., the crucibles 1 of Figure 1 are not understood to be disclosed to have a plurality of disks formed along respective cross-sections of the crucibles 1. Therefore, it is also believed that Mizugaki et al. does not teach or suggest that the crucible is divided into plural layers by a plurality of disks formed across respective cross-sections of the crucible, and that the temperature detecting means is provided in at least one of the disks for detecting a temperature distribution across that disk, as recited in Claim 73.

For at least these reasons, Applicant submits that the proposed combination of Kennedy et al. and Mizugaki et al., assuming such combination would even be permissible, would still fail to teach or suggest the crucible and temperature detecting means recited in Claim 73. Accordingly, Applicant submits that Claim 73 is patentable over these two patents, taken separately or in any proper combination.

The other claims in this application depend from either of Claims 68 or 73 discussed above and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual consideration or reconsideration, as the case may be, of the patentability of each claim on its own merits is respectfully requested.

This Amendment After Final Action is believed to place this application in condition for allowance and, therefore, its entry is believed proper under 37 C.F.R. § 1.116. Accordingly, entry of this Amendment After Final Action, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, it is respectfully requested that the Examiner contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and the allowance of the present application.

Applicant's undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

  
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Attorney for Applicant

Registration No. 24613

FITZPATRICK, CELLA, HARPER & SCINTO  
30 Rockefeller Plaza  
New York, New York 10112-3801  
Facsimile: (212) 218-2200